MarTREC

Maritime Transportation Research & Education Center

October 2014-September 2015

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MESSAGE FROM THE DIRECTOR

As you read this year's annual report, you will see that MarTREC, the Maritime Transportation Research and Education Center, had a productive year supporting the economic competitiveness of our Nation's maritime and multimodal transportation system. Sustaining network infrastructure and freight flow along our Nation's navigable waterways and amidst our ports is critical to reducing congestion on our roads and railways, supporting environmentally-friendly transportation systems, and building our national economy. This year the MarTREC consortium initiated a new Master of Science in Transportation degree, transferred research tools and knowledge into practice, and supported our future transportation workforce through development and outreach activities. I hope you will enjoy reading about our progress as much as our team of faculty, students, and transportation partners enjoyed contributing to it.

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MarTREC

Maritime Transportation Research & Education Center

RESEARCH

MarTREC conducts research activities in three research domains: 1) Maritime and Multimodal Logistics Management, 2) Building Resilient and Sustainable Multimodal Infrastructure, and 3) Livability and Emergency Management of Coastal and River Valley Communities.

VISION

MarTREC's theme is building economic competitiveness through efficient, resilient, and sustainable maritime and multimodal transportation systems. Our vision is to be recognized as the Nation's premier source for expertise on maritime and multimodal transportation research and education. Our MarTREC consortium was formed based on nationally-renowned expertise supporting the MarTREC theme, strategic location along a major navigable river or in a coastal area, and dedication to transferrable research and inclusive education and workforce development.

CONSORTIUM

Competitively funded in September 2013 through Map-21, the University of Arkansas, located in Fayetteville, AR, was awarded a Tier 1 Center entitled the Maritime Transportation Research & Education Center that focuses on building Economic Competitiveness. Our consortium consists of the University of Arkansas, Fayetteville, AR; Jackson State University (JSU), Jackson, MS; Louisiana State University, Baton Rouge, LA; and University of New Orleans, New Orleans, LA. JSU is a Minority Serving Institution and AR, LA, and MS are EPSCOR States collaborating to meet the EPSCOR goal of stimulating competitive research.

COMPLETED MarTREC RESEARCH PROJECTS

Multimodal Transport and TransLoad Facilities in Arkansas

July 2014 - December 2014
Justin R. Chimka, Ph.D.
University of Arkansas

National priorities consist of "building a clean and efficient 21st century transportation sector," and multimodal transportation is one of five Transportation System Efficiency strategies at the U.S. Department of Energy. However, additional multimodal transport may require added transload facilities where freight is moved from truck to railcar or vice versa. Greater than 550 short line and regional railroads operating in 49 states account for almost 30% of the U.S. rail network. These small businesses compete and cooperate with trucking interests to cost-efficiently connect local economies with the larger Class I railroad system. With three Class I railroads and 24 short lines in Arkansas, the state may be poised to ease state highway congestion, safeguard the environment, and support local economies by adding transload facilities.

Identifying High-Risk Roadways for Infrastructure Investment Using Naturalistic Driving Data

October 2013 - June 2015
Brian Wolshon, Ph.D., P.E., PTOE
Louisiana State University

The state-of-the-practice for most municipal traffic agencies seeking to identify high-risk road segments has been to use prior crash history. While historic traffic crash data is recognized to be valuable in improving roadway safety, it relies on prior observation rather than future crash likelihood. Recently, however, researchers are developing predictive crash methods based on "abnormal driving events." These include abrupt and atypical vehicle movements thought to be indicative of crash avoidance maneuvers and/or near-crashes. Because these types of near-crash events occur far more frequent than actual crashes, it is hypothesized that they can be used as an indicator of high-risk locations and, even more valuably, to identify where crashes are likely to occur in the future. The final report describes the results of research that used naturalistic driving data collected from global positioning system (GPS) sensors to locate high concentrations of abrupt and atypical vehicle movements in Baton Rouge, Louisiana based on vehicle acceleration and vehicle rate of change of acceleration (jerk). Statistical analyses revealed that clusters of high magnitude jerk events while decelerating were significantly correlated to long-term crash rates at these same locations. These significant and consistent relationships between jerks and crashes suggest that these events can be used as surrogate measures of safety and as a way of predicting safety problems before even a single crash has occurred.

Road Sign Recognition during Computer Testing versus Driving Simulator Performance for Stroke and Stroke+Aphasia Groups

July 2014 - June 2015
Neila J. Donovan, Ph.D.
Louisiana State University

Brain damage from stroke can affect physical mobility, sensorimotor, cognition, communication, visual perception, and visual processing which are all critical processes needed for driving. Currently, there is no consistent way to determine when a person can return to driving poststroke. Most driving studies exclude people with poststroke aphasia (PWA). However, aphasia may result in the inability to recognize

and interpret the words, symbols, and gestures on road signs, which will impact safe driving. The final report presents the results of a recent study that tested road sign interpretation tasks among groups of healthy and poststroke older drivers to assess the effects of poststroke aphasia on driving. The results showed that aphasia significantly impacted accuracy and response time of road sign interpretation. More importantly, however, as language and symbol complexity increased on road signs, the aphasia-affected drivers performed with less accuracy and required more time. Although poststroke aphasia has not been taken into account in most stroke-related driving research, these findings suggest further research is warranted and may have implications for the design of road signs and healthcare professionals who make decisions about when a PWA may safely return to driving.

Development of a Large-Scale Traffic Simulation Model for Hurricane Evacuation of Mississippi Coastal Region

July 2014 - July 2015
Feng Wang, Ph.D., P.E.
Jackson State University

This study developed an optimization model to obtain improved traffic flow assignment with a minimization of the total travel cost in a localized no-notice evacuation network. In this study, we make the following observations: (1) numerical results show that the implementation of a gate control strategy that increases the capacities of the inbound and outbound links of the selected node(s) on the Protective Action Zones (PAZ) boundary and reduces the capacities of the inbound links to the non-gate nodes on the PAZ boundary could effectively decrease the total travel cost and reduce the degree of conflicts related to traffic movements and trip routes inside the network PAZ by guiding the evacuees to evacuate from the PAZ through the gate nodes on or near the PAZ boundary, (2) experimental results show that in a no-notice or short notice evacuation for a PAZ, in which node(s) on the boundary are selected for gate control impacts the evacuation performance, the number of nodes selected for a gating strategy may also impact the evacuation performance, and (3) traffic simulations of an evacuation scenario with a large scale network show that applying the gate control strategy could improve evacuation performance.

Regional Economic Impact Study of the McClellan-Kerr Arkansas River Navigation System

Heather Nachtmann, Ph.D.
University of Arkansas
April 2014 - August 2015

In this research funded by the Arkansas State Highway and Transportation Department as a MarTREC match project, we implemented a multiregional social accounting matrix framework to estimate the economic impacts of the McClellan-Kerr Arkansas River Navigation System (MKARNS) activities on the study regions of Arkansas, Oklahoma, Kansas, Missouri, Texas, and the rest of the United States. Our study considers economic impacts from 1) Hydropower Energy Generation, 2) USACE O&M Expenditures, 3) Private Sector Investment Expenditures, 4) Port Activities, 5) Shippers' Activities, 6) Transportation Cost Savings, and 7) Recreation Benefits. We combined our analysis with a 2014 Oklahoma Department of Transportation study led by Dr. Dennis Robinson of University of Arkansas - Little Rock and found that the total economic impacts of the MKARNS nationwide are $8.5 billion in sales, $4.3 billion in gross domestic product (GDP), and $2.5 billion in labor income. In addition, 55,872 jobs are created due to the activities related to the MKARNS. Port Activities are the largest component of the total economic impacts of the MKARNS followed by Shippers' Activities and Transportation Cost Savings.

ONGOING MarTREC RESEARCH PROJECTS

MARITIME AND MULTIMODAL LOGISTICS MANAGEMENT

Dynamic Decision Modeling for Inland Waterway Disruptions

Shengfan Zhang, Ph.D.
Heather Nachtmann, Ph.D.
University of Arkansas

The inland waterway system is a major component of the U.S. transportation system. Disruption on the inland waterway system can have widespread economic and societal impacts, and their consequences can be significant. However, the uncertainty associated with the disruptive events such as extreme weather conditions have made it difficult to determine whether it is optimal to stay on the water and wait for the locked traffic to clear or if it is more economical to redirect to land transportation. The goal of this research is to facilitate decision making in the event of inland waterway disruptions considering uncertainty associated with the disruptive events. We collected and studied various reports on lock and dam closure, duration of disruptions, and their impacts on different stakeholders and developed a Markov decision process model to decide whether it is optimal to unload and change transportation mode or stay on the water from a barge owner perspective. The model aims to find the optimal decision in the event of a weather-related disruption to minimize the barge owner's loss, incorporating the uncertainty associated with reopening the waterway and incoming traffic as well as potential risk of accidents and congestion on the waterway.

Efficient Dredging Strategies for Improving Transportation Infrastructure Resilience

Kelly Sullivan, Ph.D.
University of Arkansas

The viability of the inland marine transportation system is dependent upon highly random processes including weather, shoaling, and lock degradation. These processes can render waterways impassable to large ships, forcing distributors to either rely on other, more expensive, transportation modes to satisfy their transportation needs, or take action to restore waterway navigability. This project, which seeks to determine efficient uses of maintenance dollars, is developing mathematical modeling approaches to explore cost-efficient maintenance strategies for hardening inland waterway infrastructure against the possible impacts of shoaling, weather events, and lock degradation. The research objectives are: 1) to develop mathematical models to assess the cost (to distributors using the inland waterway system) of transporting multiple products from origin(s) to destination(s) when the channel depths of all waterway segments are fixed, 2) to develop a static (i.e., not evolving over time) model for selecting maintenance projects with the aim of answering the following question: Given resource limitations what we know about current channel depths, which subset of dredge projects should be executed in the present, and 3) extend the models of the previous objective to schedule maintenance projects dynamically over time as new information about hydrologic conditions becomes known.

Economic Impacts of Lock Usage and Unavailability

Justin R. Chimka, Ph.D.
University of Arkansas

Freight statistics should provide an objective baseline for transportation policy decisions, and national economic benefits of maritime transport necessitate improving inland waterways infrastructure. Proposed work includes consolidating and learning from Lock Use, Performance, and Characteristics data collected by the U.S. Army Corps of Engineers (USACE). The objective is to estimate statistical models of annual tons locked by commodity group and lock, as a function of lock usage and unavailability, to discover knowledge of relationships between system disruption and economic consequences. This research will estimate annual tons locked by commodity group and lock, as a function of lock usage and unavailability. Estimation would require consolidation and statistical models of Lock Use, Performance, and Characteristics published by the USACE Navigation Data Center. Results will include effects of lock usage and unavailability on tons locked by commodity group. Initially we analyzed commodity groups within Mississippi waterway locks. We handle missing data by fitting statistical models a) with and without years 1993-1999 and b) with and without scheduled and unscheduled unavailabilities. For each of nine commodity groups, we began with six candidate models and sought to either eliminate lock usage and unavailability variables or use them to separate the data into clusters. We are currently diagnosing final statistical models of commodity groups and searching for consistent results.

Supporting Secure and Resilient Inland Waterways

Heather Nachtmann, Ph.D.
Justin Chimka, Ph.D.
University of Arkansas

To mitigate inland waterway disruption impacts, we developed the cargo prioritization and terminal allocation problem (CPTAP) to minimize the total value loss of disrupted barge cargoes. CPTAP is formulated as a nonlinear binary integer program, and problems of realistic size can be efficiently and effectively solved with a heuristic approach. The final solution identifies an accessible alternative terminal for each disrupted barge and the prioritized offload turn that each barge takes at its assigned terminal. Implementation of CPTAP results in reduced cargo value loss and response time when compared to a naïve minimize distance approach. This project is extending our earlier work through CPTAP model enhancement, expanded application, and improved solution approach development. The overall research objective is to provide timely knowledge and awareness of what cargoes should be prioritized for offloading during disruption response and what infrastructure exhibits low resiliency in terms of modal capacity to potential attacks or natural disasters against inland waterway transportation systems. Ongoing work is enhancing the optimization approach to CPTAP to provide real-time decision support for disruption response stakeholders to minimize the total value loss of cargo disruptions on the inland waterways.

BUILDING RESILIENT AND SUSTAINABLE MULTIMODAL INFRASTRUCTURE

Optimal Dredge Fleet Scheduling within Environmental Work Windows

Chase Rainwater, Ph.D.
Heather Nachtmann, Ph.D.
University of Arkansas

The USACE annually dredges hundreds of navigation projects through its fleet of government dredges and individual contracts with private industry. This project seeks to examine the decision of allocating dredge resources to projects system-wide under necessary constraints including environmental restrictions

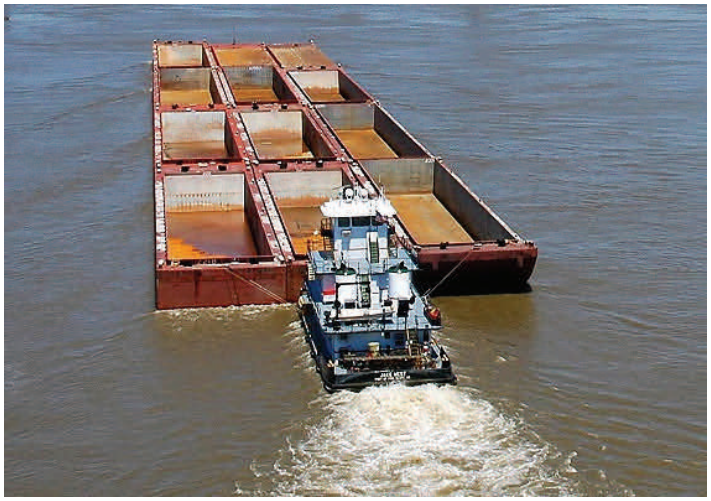


Photo courtesy of AHTD

concerning when dredging can take place due to migration patterns of turtles, birds, fish, and other wildlife, dredge equipment resource availability, and varying equipment productivity rates that affect project completion times. Building on previous research with the USACE, this project has already been successful in applying recently developed scheduling optimization tools to provide comprehensive sensitivity analysis regarding the impact of varying dredge job sizes, available dredge equipment and the size of environmental windows. Beyond sensitivity analysis, this project has expanded optimization tools to allow for multiple dredge resources to work on a single job, resources that dredge in non-consecutive intervals and environmental windows to be enforced in a dredge-specific fashion. The next phase of this research looks to enhance the capabilities of these tools to allow for large-scale planning to take place at the USACE system level.

Rapid and Non-Destructive Assessment of Levees for Strength and Liquefaction Resistance

Clinton Wood, Ph.D.
Michelle Bernhardt , Ph.D.
University of Arkansas

The goal of this research is to develop a rapid, non-destructive geophysical testing program and probabilistic framework that can be used to proactively evaluate levees. A series of geophysical field trials will be conducted to determine the most accurate and efficient methods and the best parameters for detecting various features or defects within levees. A comprehensive literature review has been compiled which identified main levee failure mechanisms, the corresponding defects associated with these failures, and the non-destructive geophysical methods that have been used to evaluate levee conditions or detect defects in the levee or foundation soil. A portion of this literature and data gathering process is still being conducted through collaborations with the USACE to obtain additional information regarding previous trials and potential use of equipment currently unavailable to the PIs. The research team is also working with the USACE as a part of Task 2 to identify levees that are suitable for the pilot study and those which could benefit from non-destructive testing during the main study. The levees will be chosen based on the availability of data from traditional geotechnical tests including cone penetration test and standard penetration test borings so that results from the geophysical tests can be compared and/or calibrated against the more traditional geotechnical tests used in design.

Photo courtesy of AHTD

In-Situ Monitoring and Assessment of Post Barge-Bridge Collision Damage for Minimizing Traffic Delay and Detour

Wei Zheng, Ph.D., P.E.
Jackson State University

This project consists of two main tasks. The first task involves optimization of sensor deployment, and the second task develops an efficient approach to promptly assessing barge-bridge collision damage. We have worked on the second task by proposing a novel probabilistic framework based on Bayesian probabilistic inference and machine learning. The trained models are used to expeditiously predict the probability of collision damage. To numerically evaluate the effectiveness of the proposed framework, the finite element model of a prototype nine-span concrete bridge over major navigation waterways has been established in Sap 2000/Bridge 14 (CSi Bridge SAP2000). Collision accidents with different damage degrees were simulated by assigning reasonable reduction factors of elastic modulus to the collision damage sub-regions. Modal analysis was performed on the damaged and undamaged bridge models to obtain the simulated responses as training dataset and testing data. In total, there are 40 training and 40 testing data obtained from the simulation. We are now concentrating upon the optimization study of sensor deployment that can efficiently capture effective information on collision damages with minimum sensors. This study could significantly reduce the number of acceleration sensors as well as cost of their installment and maintenance.

Exploration of Novel Multifunctional Open Graded Friction Courses for In-situ Highway Runoff Treatment

Yadong Li, Ph.D.
Lin Li, Ph.D.
Jackson State University

The objective of this study is to explore a novel material that can be used to effectively remove heavy metals from highway runoffs. The focus heavy metals are copper (Cu) and zinc (Zn), which have been identified as the major inorganic contaminants in highway storm water runoffs. The method to achieve the objective is to use permeable frictional courses (PFC) with carefully selected additives to absorb the heavy metals from the runoffs. Ten different additives have been tested on their absorption capabilities for Cu and Zn. As a result, two types of the additives have been chosen to be used in making PFC for further study. These two types of additives are Granular Bentonite produced by Texas Sodium Bentonite and Sodium Bentonite by Charles B. Chrystal Co., Inc. These samples have been tested for permeability, air voids, and unconfined compressive strength, and results all meet the property requirements of typical PFC payments. We are ready to move to next stage of the study, which is to produce PFC samples containing the selected additives and to test the removals of the heavy metal Cu and Zn from simulated highway runoff water by PFC samples.

LNG Bunkering for Marine Vessels at the Port of New Orleans: Siting and Facility Components

Bethany Stich, Ph.D.
James R. Amdal, Sr.
University of New Orleans

UNO's Transportation Institute (UNOTI) has been investigating various aspects of Liquefied Natural Gas (LNG) for almost 18 months. We have looked at LNG as a marine fuel and options for LNG bunkering and have assessed the state of LNG within Louisiana as a vessel fuel, as an industrial feedstock and as an export commodity with its attendant infrastructure. A recent paper submitted to the Transportation Research Board (TRB) by UNOTI investigates the status of various LNG projects within the State of

Photo courtesy of AHTD

Louisiana and natural gas in the United States during summer 2015.

LNG is causing an industrial revolution throughout Louisiana, specifically in the chemical, fertilizer, and paper industries. One concentration of new and/or expanded industrial activity is along the Mississippi River between New Orleans and Baton Rouge. Over $80B is currently being invested in plant expansions and new builds within this corridor along both banks of the river. Another nexus of LNG as an export commodity is primarily concentrated along the Gulf Coast in the extreme western part of the State along Sabine Pass, south of Lake Charles.

LIVABILITY AND EMERGENCY MANAGEMENT OF COASTAL AND RIVER VALLEY COMMUNITIES

National Inventory and Analysis of Transit Oriented Development in Proximity to Coasts and Port Facilities

John L. Renne, Ph.D., AICP
University of New Orleans

There is often a tension between the development of mixed-use transit oriented developments (TODs) and heavy industry near coastal areas and major rivers and near port facilities. The study will quantify and examine the number of jobs and residents in station areas near costal areas, major rivers, and near port facilities across the United States. The study will also forecast future development and job potential of underbuilt station areas, which could become TODs over the next several decades. The study will identify the number and type of jobs located in all types of stations and compare and contrast by typology. Some of the overall findings are:

Stations near coastlines

- 197 are within ½ mile of coastline (4.5%)
- 409 are within 1 mile of coastline (9.3%)
- 1169 are within 3 miles of coastline (26.6%)

Stations near rivers

- 229 are within ½ mile of a major river (5.2%)
- 543 are within 1 mile of a major river (12.3%)
- 879 are within 3 miles of a major river (20.0%)

Stations near ports

- 27 are within ½ mile of a major port (0.6%)
- 250 are within 1 mile of a major port (5.7%)
- 954 are within 3 miles of a major port (21.7%).

Evaluating Coastal and River Valley Communities Evacuation Network Performance Using Macroscopic Productivity

Brain Wolshon, Ph.D., P.E., PTOE
Louisiana State University

The ever-increasing processing speed and computational power of computers and simulation systems has led to correspondingly larger, more sophisticated representations of evacuation traffic processes. Today, micro-level analyses can be conducted for megaregion-level hurricane evacuations spanning multiple states over several days and include the intermodal exchange of evacuees, millions of vehicles, and thousands of miles of roadway. The goal of this research is to quantify and describe the operational conditions of evacuation traffic "network productivity." The concepts suggest that maximum production and therefore trip completion, is realized when the network achieves the highest rate of vehicles-miles traveled in a time interval. This would suggest network productivity can be maximized on a macroscopic scale as a function of demand. The research objective is to better understand evacuation productivity of coastal and River Valley communities to assist in the planning, mitigation, response, and recovery of these areas from disasters.

Vulnerability of Fuel Distribution Systems to Hazards in Coastal Communities

Brain Wolshon, Ph.D., P.E., PTOE
Louisiana State University

Coastal communities are vulnerable to disruptions in fuel availability for their transportation networks due to their susceptibility to flooding and storm surge events. Fueling station design criteria do not change in coastal communities and supply chains rely on road networks that lack the redundancy present in more inland areas. This study will examine fuel distribution disruptions from past storms and the time for restoration of fuel availability after coastal hazard events. Causes and mitigation of damaged fuel networks will be determined, and new designs and methods will be proposed to minimize disruption during coastal hazards.

Photo courtesy of AHTD

MarTREC OUTREACH

In March 2015, MarTREC participated in "Dream BIG," an outreach program organized by the Volunteer Action Center at the University of Arkansas. Several University of Arkansas female engineering students and MarTREC Director Heather Nachmann volunteered during spring break to help others Dream BIG. The students led a hands-on experiment and talked about engineering as a career choice with 40 middle school and high school girls from the Marvel-Elaine school district. The event was an opportunity to expose our youth to the engineering field. The program was partially sponsored by MarTREC.

The Mississippi Summer Transportation Institute (MSTI) was held at Jackson State University in Summer 2015 and introduced a diverse group of motivated pre-college students to the transportation industry. The three-week residential program is an excellent learning opportunity. The program promotes interpersonal skills and exposes students to real-world transportation issues. Students participate in hands-on projects designed to improve their mathematical and scientific abilities as well as their leadership skills. This year we recruited thirty-two 9th -11th graders for the program.

LSU's College of Engineering, in partnership with the Gulf Coast Center, hosted two pre-engineering Summer 2015 camps for high-school students: REHAMS (Recruiting into Engineering High Achieving Multi-Cultural Students) sponsored by Shell Oil and Xcite! (eXploration Camp Inspiring Tomorrow's Engineers) sponsored by Fluor Corporation. Both camps provide students the opportunities to gain exposure to the engineering discipline. Activities included industry field trips to the Shell Oil Company refineries in Convent and Geismar and a "Rebuilding the City" New Orleans tour hosted by the USACE.

MarTREC STUDENT ACHIEVEMENTS

Kyle Griffith is the 2014 MarTREC Outstanding Student of the Year. The 24th Annual Outstanding Student of the Year Awards ceremony took place as part of the Council of University Transportation Centers annual banquet on Saturday, January 10, 2015 during the 94th Annual TRB Meeting. Griffin was selected by the MarTREC consortium directors. He is pursuing his Ph.D. in urban studies with a focus on freight transportation planning and economic development at the University of New Orleans. A California native with cultural roots in the Caribbean, Griffin attended the University of Miami (FL) College of Engineering where he earned his Bachelor of Science degree in architectural engineering. He holds a Master of Science degree in civil engineering from Drexel University in Philadelphia, PA.

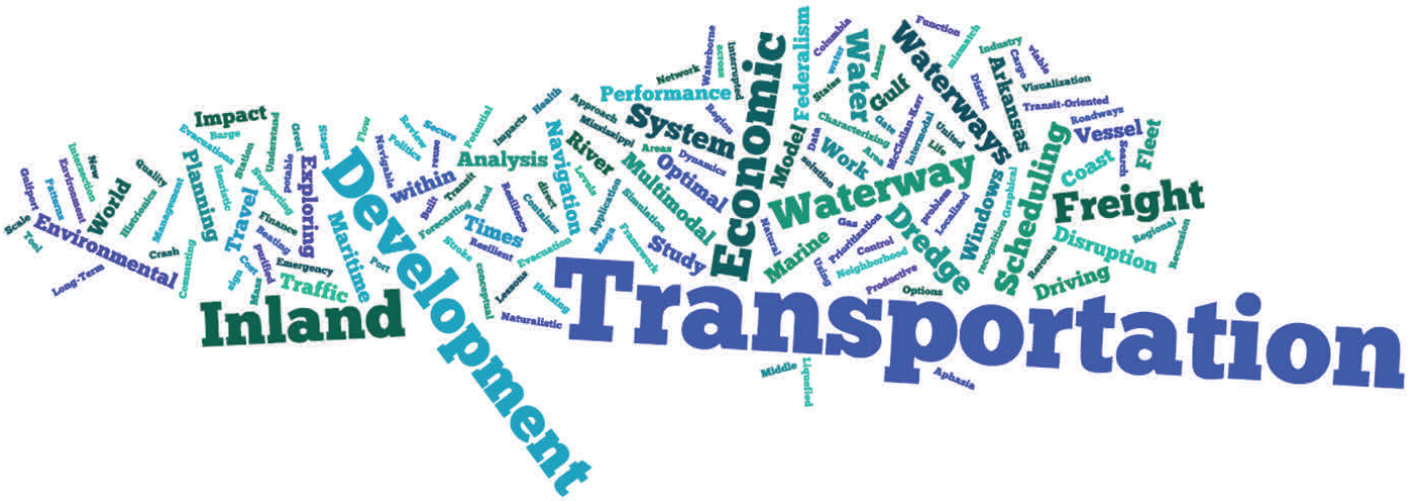
Jackson State University civil engineering senior student Ivy Riley attended the 2015 TRB annual meeting. Riley presented a poster paper "Analysis of Vessel Travel Times and River Stages" at the meeting. Automatic Identification System (AIS) data were used to analyze factors that affect vessel navigation as water levels fluctuate along major rivers in the United States. The paper was based on her research project supported jointly by the summer internship program at the Army's Engineer Research and Development Center in Vicksburg, MS, TRB's Minority Research Fellow program, and MarTREC. Riley is the 2015 TRB Minority Research Fellow for JSU.

Dr. Scott Parr moved onto the next chapter in his career in August 2015, joining the faculty of the Fullerton Department of Civil and Environmental Engineering at California State University as an assistant professor. Parr served as the Associate Director of Research for the LSU Gulf Coast Center for Evacuation and Transportation Resiliency and was actively involved with the administration of LSU's MarTREC program. He received his Doctorate degree in Civil Engineering from LSU in 2014 with a focus in transportation and emergency management. Parr's research focuses on emergency transportation operations, first responder safety, and resilient community planning.

MarTREC EDUCATION

The Louisiana Board of Regents has approved a new executive format Master of Science in Transportation (MST) degree program at the University of New Orleans, making it the first degree of its kind in the State of Louisiana. The new MST program, launched in the fall semester of 2015, is one of the first in the U.S. that trains students in multimodal freight and passenger transportation systems, so they can create the "most technically advanced, secure, efficient, accessible, competitive, dynamic and environmentally responsible systems for moving goods and people."

The new MST program is designed for traditional students and working professionals seeking career advancement or a specialized career in transportation planning or administration and is offered in a hybrid online and on-campus format that provides students with the flexibility of an online program and the benefits of concentrated on-campus meetings that will allow students to build a professional network with classmates, instructors and industry-affiliated partners. The program is housed in the Merritt C. Becker Jr. UNO Transportation Institute (UNOTI), a federally-designated University Transportation Center. Additional information about the degree program can be obtained from Associate Director of Transportation Studies Ms. Carol Short at cshort2@uno.edu or http://www.uno.edu/cola/planning-and-urban-studies/transportation-master.aspx.



MarTREC researchers made 30 conference presentations related to MarTREC this year!

MarTREC Director Heather Nachtmann presented to the U.S. Army Board on Coastal Engineering Research at the 92nd Coastal Engineering Research Board Meeting in Galveston Island, Texas on September 1, 2015. The Board functions to review programs relating to coastal engineering research and development and to recommend new research areas. Board members include Deputy Commanding General for Civil and Emergency Operations MG Donald E. Jackson, North Atlantic Division Commander COL William H. Graham, South Atlantic Commander BG Clarence D. Turner, South Pacific Commander BG Richard M. Toy, Vice President of Great Lakes Dredge and Dock Company Mr. William H. Hanson, and U.S. Naval Academy Professor of Ocean Engineering Dr. David L. Kriebel. Nachtmann presented her dredge scheduling research that was conducted with University of Arkansas Associate Professor Dr. Chase Rainwater and MarTREC Advisory Board Member Dr. Ned Mitchell. They developed a software that informs more efficient scheduling of dredge resources under current operational restrictions and offers quantitative evidence to support the productivity gains that can be realized with less restrictive environmental windows and was implemented during USACE dredge planning on the West Coast.

The National Waterways Conference held their 55th Annual Meeting on September 16-18, 2015 in Little Rock, Arkansas. The conference, partially sponsored by MarTREC, was located alongside the Arkansas River portion of the MKARNS. With 1800 miles of navigable waterways along five rivers, Arkansas is third in the nation in the number of inland waterway miles. The MKARNS' head of navigation is the Nation's easternmost inland port. The MKARNS has been upgraded from connector to corridor as part of America's Marine Highway Program.

Pictured left to right: MarTREC Advisory Board Member and Executive Director of Arkansas Waterways Commission Gene Higginbotham and USACE Little Rock Commander and District Engineer Colonel Courtney W. Paul serve on a panel for "Reaping the Multiple Benefits of the Arkansas Waterways."

MarTREC TECHNOLOGY TRANSFER

The University of New Orleans hosted the inaugural Port of New Orleans Maritime Workforce Summit on October 8, 2014. The Maritime Workforce Summit served as an annual informational forum for the New Orleans region to gain awareness about international commerce on the Mississippi River and facilitate discussion among community stakeholders on how to prepare a young, skilled workforce for the growing maritime-related job opportunities in the region. Transportation, trade, and logistics is a foundational cluster in Greater New Orleans. The five ports along the Lower Mississippi River make up the world's largest port complex with 500 million tons of cargo moved along the river. The Port of New Orleans contributes 165,000 jobs statewide and 380,000 jobs nationally.

MarTREC Director Heather Nachtmann delivered an invited talk at the 2014 UTC Spotlight Conference on December 9, 2014. Nachtmann described future maritime challenges and identified opportunities to engage the research community to help address these challenges. Discussion topics included how waterborne freight directly and indirectly supports U.S. economic growth by contributing to economic value, earnings, and employment, opportunities in maritime multiagency engagement in projects and programs, how individualized agency budgets may hinder funding related to system performance, and Panama Canal expansion opportunities for coastal and inland ports.

On April 8, 2015, Dr. Brian Wolshon, one of the leading experts in America on evacuation planning, presented in Sydney, Australia. Wolshon, Professor in the Department of Civil and Environmental Engineering at Louisiana State University and MarTREC Site Director, has conducted numerous studies on evacuation. Professor Wolshon's presentation highlighted a recent U.S. DOT supported project that applied the state-of-the-art traffic simulation modeling for future evacuation plan assessment and improvement. As part of this work, a regional multimodal model for the southeast Louisiana highway network was developed to replicate the temporal and spatial travel movements of metropolitan New Orleans prior to Hurricane Katrina in 2005.

CENTER FOR TRAINING TRANSPORTATION PROFESSIONALS

Left to Right—Mary Fleck, Najma Alam, Frances Griffith, Stacy Williams, Roselie Conley, and Diane Allen

The Center for Training Transportation Professionals (CTTP) has again been hard at work this year, offering 23 courses and certifying 333 technicians! Primary courses offered include Basic Aggregates, Concrete Field Testing, Hot Mix Asphalt, Soils, and Concrete Strength Testing. The National Pollutant Discharge Elimination System (NPDES) course has also been in demand. In May 2015, the pilot offering of the Inertial Profiling Systems Certification was held in Pine Bluff, Arkansas, and 7 technicians received certification. This course includes an online training module and one-day testing, including a written exam and performance exams in which technicians use inertial profiling equipment to determine profiles and smoothness measurements of asphalt and concrete sections of a test track.

Other types of online training offerings have increased this year as well, with refresher training now available in Basic Aggregates, Concrete Field Testing, Basic Math for Transportation, and basic math modules relating specifically to Asphalt, Concrete, and Soils testing. For Concrete Field Testing, the online training has been used as part of the newly offered 'Test Only' option, in which students review materials online, take an online quiz, and then attend a one-day testing session in which they complete both written and performance exams.

CTTP continues to be actively engaged in the Technology Transfer program, offering courses in Asphalt Pavement Maintenance, Stormwater Management, Basic Pavement Management, and Roadway Safety Enhancements. CTTP also received a grant to develop additional training, entitled 'Low Cost Safety Solutions for Local Agencies', which was offered as multiple classroom instructor-led sessions, and as a two-part webinar. Additional work has been done to assist counties and cities with the implementation of pavement management systems. This work led to the development of a 'hybrid' chip seal treatment, which has been used in a pilot project in Sebastian County. Finally, the ROADS Scholar Program continues to grow, and the first group of graduates will be recognized at the upcoming fall meeting of the Arkansas Association of County Judges.

DAN FLOWERS DISTINGUISHED LECTURE SERIES

November 6, 2014

Kenneth "Ned" Mitchell, Ph.D.
Research Civil Engineer
Coastal and Hydraulics Laboratory
U.S. Army Engineer Research and Development Center

Optimization Formulations and Strategies for Navigation Systems Operations and Maintenance

Pictured with Director Heather Nachtmann

April 24, 2015

Scott E. Bennett, P.E.
Director
Arkansas State Highway and Transportation Department

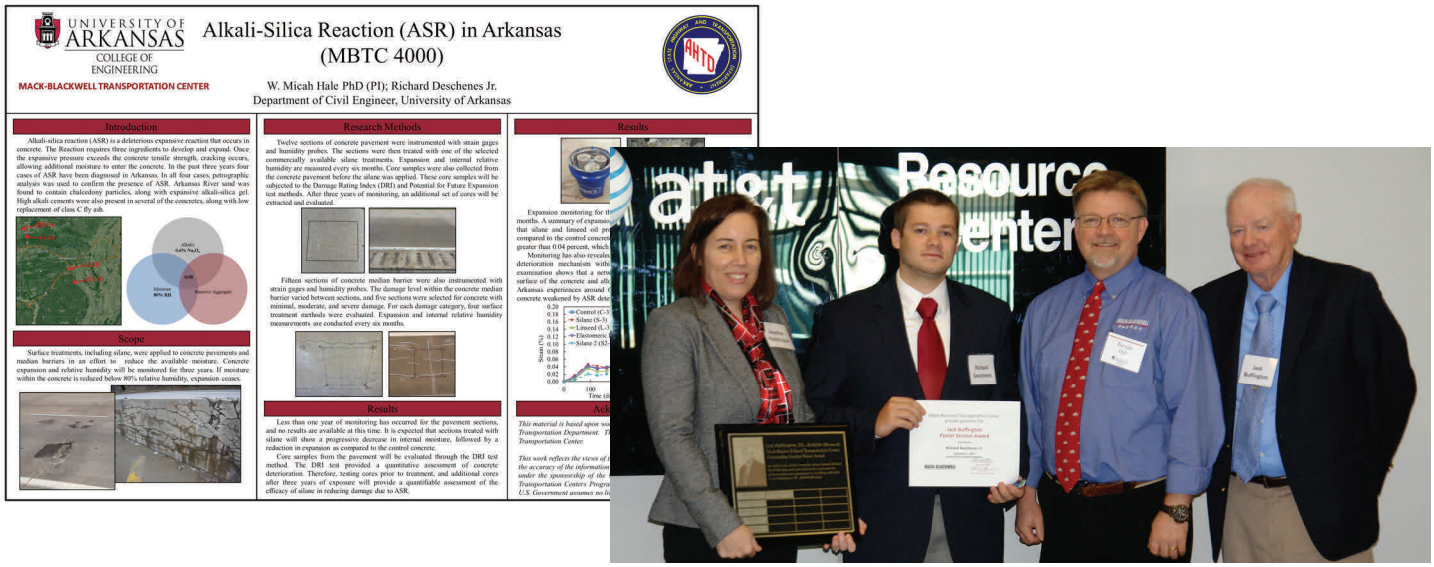
Arkansas Highways: The Good, The Bad, The Ugly
The Good: Numerous safety improvements, The Bad: Drivers consumed 115 million fewer gallons of gas and diesel in 2014 than in 2007, and The Ugly: Continuing uncertainty of the Federal Highway Trust Fund

September 24, 2015

Evening with the Pros

Haley Brightwell, a civil engineer with Wal-Mart, was joined by **Charles Zimmerman**, Wal-Mart's Vice-President of International Construction, to talk with civil engineering students about engineering careers in the business community. Brightwell and Zimmerman were members of an expert panel organized by the Arkansas Academy of Civil Engineering as part of its annual "An Evening with the Pros" career-advising event.

JACK BUFFINGTON OUTSTANDING STUDENT POSTER AWARD



Pictured from left to right; Heather Nachtmann, Richard Deschenes Jr., Kevin Hall, and Former Mack-Blackwell Director Jack Buffington.

In November 2014, Richard Deschenes, Jr. was awarded the 2014 Jack Buffington Outstanding Student Poster Award. Deschenes presented his poster on pavement Alkali-Silica reactions in Arkansas at the 2014 Mack-Blackwell Advisory Board Meeting and was selected by the MBTC Advisory Board. Deschenes is a civil engineering graduate student working under the supervision of Professor Micah Hale. His work is sponsored by the Arkansas State Highway and Transportation Department.

TRANSPORTATION LEADERS OF THE 21ST CENTURY

Transportation Leaders of the 21st Century (TL21) is a student-led group funded under the Southern Plains Transportation Center. The University of Arkansas chapter was started in the fall of 2015 and has a blend of undergraduate and graduate students from both the civil engineering and industrial engineering departments. The thirteen new student members have expressed interest in performing outreach, meeting local and state leaders in transportation, performing a yearlong project that ties together transportation and leadership themes, hosting the SPTC student conference, and meeting for advanced learning in both transportation and leadership. During the fall semester, focus areas will be identified for completion during the spring. It is envisioned that this group will participate in regional collaborative activities. Civil engineering assistant professors Andrew Braham and Sarah Hernandez are the faculty advisors to TL21.

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